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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/552,464	10/07/2005	Kozo Murao	279302US0PCT	2239

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EXAMINER	
LISTVOYB, GREGORY	
ART UNIT	**PAPER NUMBER**
1796	

NOTIFICATION DATE	DELIVERY MODE
11/09/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/552,464	MURAO ET AL.	
	Examiner	Art Unit	
	GREGORY LISTVOYB	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 September 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/29/2009 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-15 rejected under 35 U.S.C. 103(a) as being unpatentable over Hwang et al (Biotransformation of Acrylonitrile, Biotechnology and Bioengineering, vol 34 pp 380-386 (1989)), herein Hwang (cited in a previous Office Action) in combination with Abe et al (US patent 5476883) herein Abe, Ishii et al (US patent 6043061) herein Ishii (cited in a previous Office Action) and Murao et al (WO 02/50297 and US publication 2004/0048348) herein Murao (cited in a previous Office Action)

Hwang discloses a method for producing an acrylamide polymer comprising hydrating of acrylonitrile (ACN) with following enzymatic conversion of ACN to acrylamide and polymerizing monomers containing the acrylamide (p.381-382).

The enzymatic method carried out using microbial cells of a Nitrile Hydrataze as a catalyst (p.380-381).

Regarding limitation of claim 1, stating that the acrylamide polymer is white in the form of a powder and is colorless in the form of an aqueous solution, since Hwang's polymer, modified with Abe and Ishii, would have the same structure as one, disclosed in the application examined, it would be expected that Hwang's Acrylamide would form white powder or colorless solution.

Regarding new limitation of claims 1 and 11 claiming polymerization temperature of 10-90C, Hwang discloses a polymerisation temperature of 10C.

Hwang does not disclose that concentration of Oxazole is less than 5 mg/kg or less and Hydrogen Cyanide concentration is 1 mg/kg or less.

Abe discloses a preparation process of Acrylamide from purified Acrylonitrile with following polymerization to Acrylamide polymer (see Example 1), where Oxazole is completely removed from Acrylonitrile (See Table 1, Example 1, where Oxazole is not detected with detection limit of 1.0 mg/kg (ppm)). Abe teaches that Acrylonitrile

undergoes a purification procedure (see column 8, line 35), where Oxazole concentration reduces from 25 mg/kg to non-detectable limit (below 1 mg/kg) (see Table 1). Abe discloses that acrylamide required to be promptly dissolved in water with only trace amount of unreacted toxic monomer permitted (see Column 1, line 35).

Note that both Application and Abe teach that oxazole does not participate in the polymerization process, but contributes to water insoluble unreacted monomer (see Spec pages 2 and 3), affecting color (Spec) and toxicity (Abe) of the polymer. Therefore, the presence of oxazole as an impurity of the starting material is undesirable in any process of acrylamide production.

Abe teaches that Acrylamide, which has been synthesized by subjecting the Acrylonitrile to hydration has higher stability and when polymerized, provides an aqueous solution of higher viscosity compared with Acrylamide synthesized likewise from oxazole-containing Acrylonitrile (Column 2, line 20).

Ishii teaches a process for producing Acrylamide by enzymatically hydrating Acrylonitrile (see Example 1), where concentration of Hydrogen Cyanide is equal or less than 1 mg/kg (see Examples 1-3 and Tables 1-3).

Ishii teaches that decreasing a concentration of Hydrogen Cyanide leads to lowering a deactivation rate of an enzyme (See Column 6, line 65).

Therefore, it would have been obvious to a person of ordinary skills in the art at the time the invention was made to use Acrylonitrile with Oxazole concentration of 5 mg/kg or less and Hydrogen Cyanide concentration is 1 mg/kg or less in order to produce polyacrylamide with high viscosity and achieve higher catalytic activity of the enzyme (which relates to Hydrogen Cyanide) and to decrease insoluble toxic monomer content in the polymer (which relates to Oxazole).

Hwang does not disclose that the reaction carries until the concentration of Acrylamide riches at least 30% by mass or more.

Murao teaches an enzymatic process of Acrylonitrile conversion to Acrylamide at the presence of microbial cell of a Nitride Hydrates, where reaction carries until Acrylamide concentration reaches 45% mass (see Example 1).

Therefore, it would have been obvious to a person of ordinary skills in the art at the time the invention was made to carry out the conversion of Acrylonitrile to Acrylamide until Acrylamide reaches the concentration of 30% mass or more in order to make economically sound process.

Response to Arguments

Applicant's arguments filed 9/29/2009 have been fully considered but they are not persuasive.

Regarding Abe and Ishii, applicant argues that the references represent non-enzymatic processes, different from Hwang.

However, both Application and Abe teach that oxazole does not participate in the polymerization process, but contributes to water insoluble unreacted monomer (see Spec pages 2 and 3), affecting color (Spec) and toxicity (Abe) of the polymer. Therefore, the presence of oxazole as an impurity of the starting material is undesirable in any process of acrylamide production.

Applicant submits that Murao fails to disclose or suggest the oxazole and/or hydrogen cyanide content in the acrylonitrile starting material.

Examiner submits that purification of acrylonitrile from oxazole and hydrogen cyanide is disclosed in Abe and Ishii references. In particular, Ishii teaches that decreasing a concentration of Hydrogen Cyanide leads to lowering a deactivation rate of an enzyme (See Column 6, line 65).

In general, an artisan always concerns about impurities in the initial reagents. In this particular case one skilled in the art exactly knows from the prior art the effect of

presence of oxazole and hydrogen cyanide. It leads to toxicity of the resulting polymer and increases deactivation rate of an enzyme. Therefore, an artisan has a motivation to purify the starting material from those impurities.

Regarding data of Table 1, Examiner submits that the data presented do not commensurate with the scope of the claim 1. Claim 1 claims the amount of oxazole of less than 5 ppm and the amount of hydrogen cyanide of less than 1 ppm. In Comparative Examples 2 and 3 the amount of oxazole is 10 ppm, which as twice as high than the claimed amount. Comparative Examples 2 and 3 disclose amount of hydrogen cyanide as five times higher than the claimed amount.

Applicant argues that Examiner does not compare data of Table 1 with closest prior art. Examiner disagrees. Ishii teaches concentration of Hydrogen Cyanide is equal or less than 1 mg/kg (see Examples 1-3 and Tables 1-3). Abe teaches that where Oxazole is not detected with detection limit of 1.0 mg/kg (ppm). In both cases corresponding claim 1 limitations are met.

In order to compare the Invention with closest prior art, Applicant should demonstrate the data, where initial material is purified with Ishii's and Abe's procedures, polymerize the monomers according Hwang's method and then show the difference between the resulting polymer and inventive one.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GREGORY LISTVOYB whose telephone number is (571)272-6105. The examiner can normally be reached on 10am-7pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on (571) 272-1078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

GL/GREGORY LISTVOYB/

Examiner, Art Unit 1796